



SNS COLLEGE OF ALLIED HEALTH SCIENCES

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**DEPARTMENT : OPERATION THEATRE AND ANAESTHESIA
TECHNOLOGY**

COURSE NAME : PHARMACOLOGY

UNIT : RESPIRATORY SYSTEM

**TOPICS : BRONCHODILATORS, RESPIRATORY STIMULANTS,
BRONCHOLYTIC AGENTS**



BRONCHODILATORS



- Bronchodilators are drugs that relax and widen the airways (bronchi and bronchioles) in the lungs.
- By dilating the airways, these medications help to improve airflow, making it easier for individuals to breathe.



BETA 2 - ADRENERGIC AGONISTS



Class: Short-acting (e.g., albuterol), long-acting (e.g., salmeterol), ultra-long-acting.

Mechanism of Action: Stimulate beta2 receptors, leading to relaxation of bronchial smooth muscle.

Pharmacodynamics: Bronchodilation, increased airflow.



Pharmacokinetics:

Absorption: Rapid with inhaled administration, variable with oral administration.

Distribution: Localized effects in bronchial smooth muscle with limited systemic absorption.

Metabolism: Minimal hepatic metabolism, especially with inhaled forms.

Excretion: Eliminated renally, often as metabolites.



Forms: Inhalers, nebulizers, oral tablets.

Indications: Asthma, COPD.



Contraindications: Hypersensitivity.

Side Effects: Tachycardia, tremor, hypokalemia.

Technician Role : To Monitor Peak flow measurements, heart rate, potassium levels.



ANTICHOLINERGIC AGENTS (Antimuscarinics)



Class: Ipratropium bromide (short-acting), tiotropium (long-acting).

Mechanism of Action: Block muscarinic receptors, preventing bronchoconstriction.

Pharmacodynamics: Bronchodilation, reduced mucus secretion.



Pharmacokinetics:

Absorption: Rapid with inhaled administration, limited systemic absorption.

Distribution: Localized effects in bronchial smooth muscle with minimal systemic distribution.

Metabolism: Minimal hepatic metabolism.

Excretion: Eliminated renally, often as metabolites.



Forms: Inhalers, nebulizers.

Indications: COPD, sometimes used in asthma.



Contraindications: Hypersensitivity.

Side Effects: Dry mouth, urinary retention.

Technician Role: To Monitor Lung function tests, symptom relief.



METHYLXANTHINES



Class: Theophylline.

Mechanism of Action: Inhibit phosphodiesterase, increasing cAMP, resulting in bronchodilation.

Pharmacodynamics: Bronchodilation, increased diaphragmatic contractility.



Pharmacokinetics:

Absorption: Variable with oral administration, influenced by food and individual variations.

Distribution: Widespread distribution, crosses the blood-brain barrier.

Metabolism: Mainly hepatic metabolism, especially with theophylline.

Excretion: Eliminated renally, primarily as metabolites.



Forms: Oral tablets, intravenous.

Indications: Asthma, COPD.



Contraindications: Hypersensitivity, active peptic ulcer.

Side Effects: Nausea, insomnia, tachycardia.

Technician Role : To Monitor Serum theophylline levels, signs of toxicity.



RESPIRATORY STIMULANTS



- Respiratory stimulants are drugs that stimulate the respiratory centers in the brain, leading to an increase in respiratory rate and depth.
- These medications are often used to counteract respiratory depression or apnea.



XANTHINE DERIVATIVES



Class: Doxapram.

Mechanism of Action: Central respiratory stimulation.

Pharmacodynamics: Increased respiratory rate and depth.



Pharmacokinetics:

Absorption: Rapid with intravenous administration.

Distribution: Rapid distribution to the central nervous system.

Metabolism: Metabolized in the liver.

Excretion: Eliminated renally, often as metabolites.



Forms: Intravenous.

Indications: Respiratory depression or apnea.



Contraindications: Seizure disorders, hypersensitivity.

Side Effects: Tremor, increased heart rate.

Technician Role : To Monitor Respiratory rate, heart rate, blood pressure.



OPIOID ANTAGONISTS



Class: Naloxone.

Mechanism of Action: Reversal of opioid-induced respiratory depression.

Pharmacodynamics: Competes with opioids at receptor sites.



Pharmacokinetics:

Absorption: Rapid with intramuscular, intravenous, or intranasal administration.

Distribution: Rapid distribution to the central nervous system.

Metabolism: Metabolized in the liver.

Excretion: Eliminated renally, often as metabolites.



Forms: Intramuscular, intravenous, intranasal.

Indications: Opioid overdose.



Contraindications: Hypersensitivity.

Side Effects: Rapid opioid withdrawal, increased heart rate.

Technician Role : To Monitor Respiratory rate, level of consciousness.



BRONCHOLYTIC AGENTS



- Broncholytic agents include medications that help in the management of respiratory conditions by modifying and improving the properties of respiratory secretions, making them easier to clear.



EXPECTORANTS



Class: Guaifenesin.

Mechanism of Action: Increase respiratory tract fluid to facilitate mucus removal.

Pharmacodynamics: Enhanced mucus clearance.



Pharmacokinetics:

Absorption: Moderate systemic absorption with oral administration.

Distribution: Widespread distribution in the body.

Metabolism: Metabolized in the liver.

Excretion: Eliminated renally, often as metabolites.



Forms: Oral tablets, syrups.

Indications: Chest congestion.



Contraindications: Hypersensitivity.

Side Effects: Nausea, vomiting.

Technician Role : To Monitor Symptom relief.



MUCOLYTICS



Class: Acetylcysteine.

Mechanism of Action: Break down and thin respiratory mucus.

Pharmacodynamics: Improved mucus viscosity.



Pharmacokinetics:

Absorption: Variable absorption depending on the formulation (e.g., acetylcysteine).

Distribution: Local and systemic effects on respiratory secretions.

Metabolism: Variable, may occur in the liver.

Excretion: Eliminated renally, often as metabolites.



Forms: Inhalation, oral.

Indications: Conditions with thick, tenacious mucus (e.g., chronic bronchitis).



Contraindications: Hypersensitivity.

Side Effects: Nausea, Vomiting.

Technician Role : To Monitor Symptom relief, improved mucus clearance.



ASSESSMENT



- What is the Pharmacokinetics of Expectorants ?
- What is the Mechanism of Action of Mucolytics ?